

# A Simple and Safe Minimally Invasive Technique for Laparoscopic Gastrostomy

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## ABSTRACT

**Introduction:** Percutaneous endoscopic gastrostomy (PEG) is the procedure of choice in the nutritional management of patients requiring gastrostomies. However, PEG tubes are not always feasible. The aim of the present study was to determine the feasibility, complications, and adequacy of feeding support of a novel laparoscopic gastrostomy technique in adults where PEG tubes were neither feasible nor safe.

**Methods:** A retrospective chart review of patients who underwent a laparoscopic gastrostomy from August 2007 to July 2008 was performed. Demographic and outcome data were abstracted.

**Results:** Fourteen patients underwent laparoscopic gastrostomy. Nine had obstructing head/neck cancer, 2 had severe head trauma, and one was morbidly obese. Nine patients had previous abdominal surgery. The mean operative time was 29.8 minutes ( $\pm 7.2$ ). There were no conversions to open gastrostomy. Two ports (5mm and 10mm) were used in the majority of patients (78.5%). No major complications were observed. The mean follow-up was 3.1 months (range, 2 to 8).

**Conclusion:** This innovative 2-port laparoscopic technique for gastrostomy tube placement is safe and effective. It allows for the quick, accurate, and safe insertion of the feeding tube under direct visualization and avoids open techniques in patients where PEG tubes are not feasible.

**Key Words:** Laparoscopy, Percutaneous endoscopic gastrostomy.

## INTRODUCTION

Enteral access is the treatment of choice for malnourished patients with a normally functioning gastrointestinal tract. Percutaneous endoscopic gastrostomy (PEG) was developed in the early 1980s and has become the standard procedure for enteral nutrition in these patients.<sup>1</sup> However, PEG tubes are not always feasible. The aim of this study was to evaluate the feasibility and safety of the laparoscopic gastrostomy (LG) performed in an adult population for morbid obesity, obstructing pharyngeal or esophageal cancers, severe head trauma, or history of multiple abdominal surgeries. In this article, we report our early experiences with this method.

## METHODS

A retrospective chart review was performed of all patients who underwent LG from August 1, 2007 to May 21, 2008 at Tulane University. Collected data included patient age, sex, indication for the procedure, number of previous abdominal surgeries, and both procedure-specific and nonspecific complications. Approval for the study was obtained from the Tulane School of Medicine Institutional Review Board. Data are presented as the mean  $\pm$  standard errors.

## Procedure

With the patient under general anesthesia, a supraumbilical or infraumbilical incision is used to establish pneumoperitoneum with either an open or closed technique. Pneumoperitoneum is created with a CO<sub>2</sub> pressure between 5mm Hg to 10mm Hg. A 5-mm port is placed, and a 30° angled laparoscope is inserted. The table is then tilted in a reverse Trendelenburg position and by using digital palpation and laparoscopic screening; the site for the gastrostomy tube placement is chosen (**Figure 1**). Ideally, placement for the gastrostomy tube should be along the greater curvature. A 10- to 11-mm port is then introduced under direct vision over the designated site for the tube placement (**Figure 2**). This site should be at least 2cm caudal to the costal margin. The gastric wall is then grasped with a 10-mm laparoscopic Babcock forceps and brought through the port site while simultaneously re-

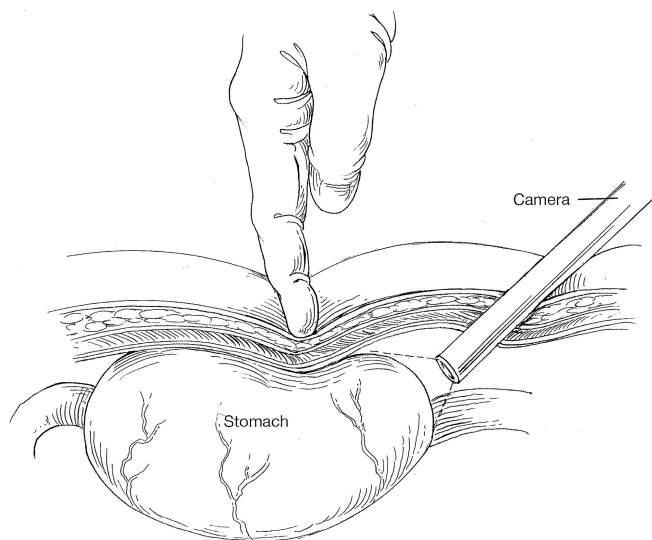
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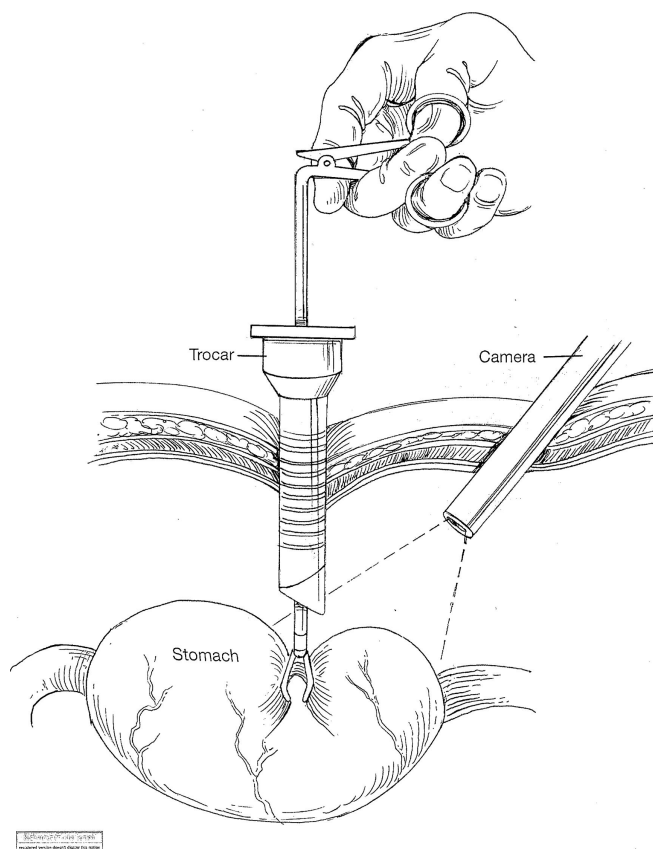


**Figure 1.** Digital palpation at the site of planned gastrostomy under 5-mm camera direct visualization.

moving the trocar and decreasing the pneumoperitoneal pressure to 0mm Hg (**Figure 2**). Once exteriorized, the gastric wall is secured with 2 Babcock forceps. Double purse-string sutures (00) are then placed at the exposed stomach, which will be used later as anchoring sutures to the peritoneum. A gastrostomy is opened at the center of the loop by diathermy. A balloon gastrostomy tube is then inserted (**Figure 3**). A large-size Foley catheter, mushroom catheter, or Moss tube can be used. The balloon of the feeding tube should then be positioned behind the inner purse string. The incision is sometimes enlarged up to an additional 1cm for placement of the purse-string sutures. The stomach is then pushed back to the abdominal cavity and the anchoring sutures used to attach the stomach to the anterior abdominal wall. Pneumoperitoneum (10mm Hg) is recreated to check for hemostasis and any evidence for leakage around the gastrostomy insertion site. The feeding tube is then placed to gravity, and tubal feeding is started the next day.

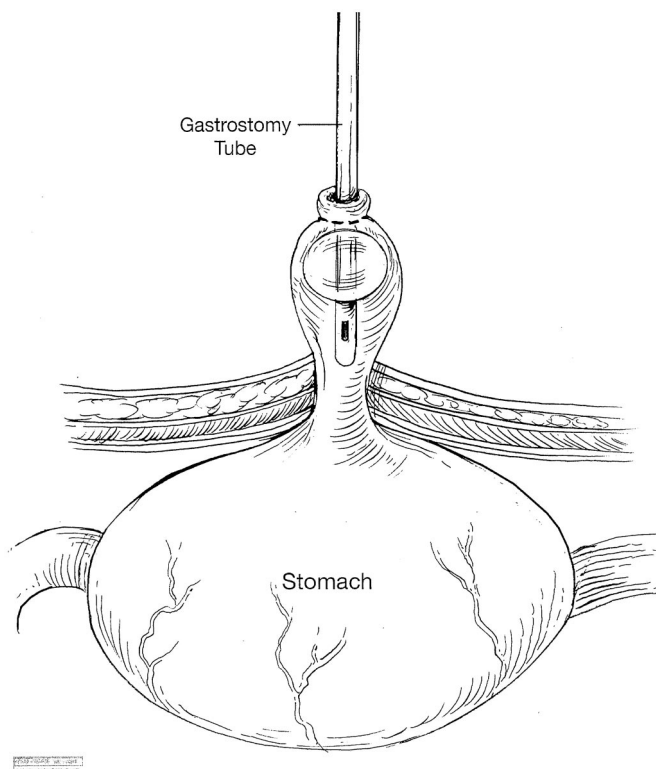
## RESULTS

Fourteen patients underwent LG during the study period. All the adults were selected for this procedure after a primary PEG procedure was considered not feasible or unsafe by the surgeon. Nine patients had obstructing head/neck cancer, 2 patients had severe head trauma, 1 was morbidly obese (Body Mass Index 56kg/m<sup>2</sup>), and 2 had multiple upper abdominal surgeries. The mean age



**Figure 2.** Gastric wall is grasped with a 10-mm laparoscopic Babcock forceps and brought through the port site whilst the trocar is simultaneously removed and the pneumoperitoneal pressure is decreased to 0mm Hg

was 59.1 years (range, 19 to 95); 3 patients were female. The mean operative time was 29.8 minutes ( $\pm 7.2$ ). There were no conversions to open. Two ports (5mm and 10/11mm, Ethicon Endosurgery, Inc., Newark, NJ) were used in the majority of patients (78.5%); however, up to 4 ports had to be placed (3 of 14 patients; 21.5%) when lysis of adhesions was required. Lysis of adhesions was needed in 3 of 9 patients who had previous abdominal surgery. No major intraoperative or postoperative complications were observed. Minor postoperative complications included 3 superficial wound infections and 2 premature dislodgments. These dislodgments were at 3 and 16 days postoperatively and were managed by placement of a new feeding tube under fluoroscopy. Superficial wound infections were managed conservatively with local wound care and oral antibiotics. Every patient had a successful tubal feeding within 24 hours from the operation. The mean follow-up was 3.1 months (range, 2 to 8).



**Figure 3.** The stomach is opened at the center of the purse-string suture by diathermy and a balloon gastrostomy tube is then inserted and positioned behind the inner purse string.

## DISCUSSION

Since its first description in 1979 by Gauderer<sup>1</sup> for use in the pediatric population, percutaneous endoscopic gastrostomy (PEG) tubes have become the gold standard for nutritional assistance in adult patients who are dysphagic secondary to neurologic deficits or secondary to treatment of obstruction from head and neck cancers. However, PEG tube placement requires that a light source be passed from the esophagus and into the stomach to act as a guide for the percutaneous procedure. This method is neither always feasible nor safe in cases of obstruction from head and neck cancer or head trauma. Additionally, there might be an inability to transilluminate due to morbid obesity, ascites, or colon or liver overlying the stomach. Consequently, several alternative methods for laparoscopic feeding tube insertion have been described. However, unlike our technique, these methods are sometimes expensive, complicated, and time consuming.<sup>2,3</sup> Hsieh et al<sup>2</sup> used a 3-port method in an adult population of 48 patients with obstructing head and neck cancers. Interestingly, not only was the insertion time longer in this published report compared with our technique ( $62.4 \pm 11$  min vs.  $29.8 \pm 7.2$

min, respectively), but these authors also used an additional port for their LG method.

Our innovative, simple, 2-port laparoscopic technique makes it possible to place the gastrostomy tube with ease. It allows direct viewing and manipulation of the stomach into a position where it can be safely punctured for placement of a gastrostomy tube, and because it is performed under direct vision it also minimizes the risk of inadvertent visceral injury. Consequently, our procedure carries a low rate of complications. In fact, in our series, the complication rate of 12% is lower than the incidence reported by others (23%).<sup>3</sup>

Besides LG, laparoscopic-assisted percutaneous endoscopic gastrostomy (LAPEG) has also been used in instances where PEG placement has either failed or is contraindicated.<sup>4,5</sup> This technique involves placing one laparoscopic optical trocar into the right midabdomen then utilizing direct visualization to identify the needle track for PEG placement.<sup>4</sup> Unlike our 2-port method, however, LAPEG cannot be used in severely stenotic or obstructing upper digestive tracts due to the inherent need to pass a light source through the esophagus. In addition, our 2-port method allows the added advantage of doing a diagnostic laparoscopy and gastrostomy tube placement in one procedure versus converting to a 2-port method after LAPEG.

## CONCLUSION

We have shown that our 2-port placement of a laparoscopic gastrostomy is not only safe and effective but also has clear benefits over previously reported laparoscopic techniques. The characteristic feature of our technique is that it requires only 2 ports and no intracorporeal suturing. In addition, our technique does not require the stomach to be insufflated during the procedure. These in turn reduce operative time, expense, and difficulty. Therefore, our LG procedure should be considered an alternative to provide enteral access for malnourished patients when PEG is neither feasible nor safe.

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